

**VERTICAL CAVITY SURFACE EMITTING LASER INCLUDING  
INDIUM IN THE ACTIVE REGION**

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**ABSTRACT OF THE DISCLOSURE**

Quantum wells and associated barriers layers can be grown to include nitrogen (N), aluminum (Al), antimony (Sb), phosphorous (P) and/or indium (In) placed within or about a typical GaAs substrate to achieve long wavelength VCSEL performance, e.g., within the 1260 to 1650 nm range. In accordance with features of the present invention, a vertical cavity surface emitting laser is described that includes at least one quantum well comprised of InGaAs; GaAsN barrier layers sandwiching said at least one quantum well; and GaAsN confinement layers sandwiching said barrier layers. GaAsN barrier layers sandwiching the quantum well and AlGaAs confinement layers sandwiching the barrier layers can also be provided with a InGaAs quantum well. AlGaAs barrier layers sandwiching the at least one quantum well and GaAsN confinement layers sandwiching the barrier layers can also be provided with a InGaAs quantum well. Quantum wells can be developed up to and including 50 Å in thickness. Quantum wells can also be developed with a depth of at least 40 meV.